S'09 : 7 FN : CP 424/434 (1459)

COMPUTER GRAPHICS

Time : Three hours

Maximum Marks : 100

Answer FIVE *questions, taking* ANY TWO *from* **Group A,**
ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question (a,b,etc.) should
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented
with neat sketches. Unnecessary long answer may
result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving
proper justification.*

Figures on the right-hand side margin indicate full marks.

Group A

1. (*a*) Write a brief note on different display devices.   8

    (*b*) Explain about CRT.   10

    (*c*) What is frame buffer ?   2

2. (*a*) Explain about Bresenham's line drawing algorithm. 10

    (*b*) Write any *two* polygon interface algorithm.   6

    (*c*) Describe about pattern filling techniques.   4

3. (*a*) Discuss in detail about inverse transformations.   8

(Turn Over)

AMIE(I) STUDY CIRCLE, SECOND FLOOR, SULTAN TOWER, ROORKEE - 247667 (UTTARANCHAL)   EMAIL: pcourses@hotmail.com   Ph: (01332) 266328, 9412903929, 9897394020

1

(b) Give a note on rotation about an arbitrary point.   7

(c) What are the curve fitting techniques ? Explain.   5

4. (a) How to draw a circle using mid-point circle drawing algorithm ?   8

(b) Give the matrix representation for two-dimensional scaling, shearing and reflection.   8

(c) Define aliasing and anti-aliasing.   4

Group B

5. (a) Explain about Southerland Hodgeman polygon clipping.   7

(b) How can clip a text ? What are the types of text clipping ?   6

(c) Discuss about Cohen Southerland outcode line clipping algorithm.   7

6. (a) Explain about curve and area clipping.   6

(b) How to animate a two-dimensional figure using transformation techniques ?   8

(c) Explain about Z buffers.   6

7. (a) Discuss about the perspective projection in detail.   10

(b) What is windowing transformation ?   3

(c) Explain about binary space partition.   7

8. (a) Explain about three-dimensional transformation.   8

(b) Write a note on parallel projection.   5

(c) Discuss in detail about Warnock's algorithm.   7

Group C

9. Answer the following in short : 2×10

(i)   What is display file ?

(ii) Mention drawbacks of DDA algorithm.

(iii) Give the scaling matrix and general fixed point matrix.

(iv) What is transformation ? Write its different types.

(v)   What is seedfill algorithm ?

(vi) What is clipping ? Write its different types.

(vii) What is halftoning ?

(viii) Write the types of parallel projection.

(ix) What is viewing transformations ?

(x)   What are the steps to get reflected image through an arbitrary line ?

AMIE(I) STUDY CIRCLE, SECOND FLOOR, SULTAN TOWER, ROORKEE - 247667 (UTTARANCHAL)   EMAIL: pcourses@hotmail.com   Ph: (01332) 266328, 9412903929, 9897394020

2

COMPUTER GRAPHICS

Time : Three hours

Maximum Marks : 100

Answer FIVE *questions, taking* ANY TWO *from* **Group A** ,
ANY TWO *from* **Group B** *and* ALL *from* **Group C**.

*All parts of a question (a, b, etc.) should
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented
with neat sketches. Unnecessary long answers may
result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving
proper justification.*

Figures on the right-hand side margin indicate full marks .

Group A

1. (a) Write about different display devices.   8

    (b) Explain the working of CRT.   10

    (c) Name some interactive devices.   2

2. (a) Explain about Brassenham's line drawing algorithm. 10

    (b) Explain scanline algorithm.   7

    (c) Write a short note on halftoning.   3

3. (a) Discuss in detail about inverse transformations.   8

AMIE(I) STUDY CIRCLE, SECOND FLOOR, SULTAN TOWER, ROORKEE - 247667 (UTTARANCHAL)   EMAIL: pcourses@hotmail.com   Ph: (01332) 266328, 9412903929

3

(b) Give the equations for translation of an object.   4

(c) Explain curve drawing algorithms.   8

4. (a) How is mid-point circle algorithm used to draw a circle?   8

(b) Define aliasing and antialiasing.   4

(c) Write short notes on 'shearing' and 'reflection'.   8

Group B

5. (a) What do you mean by clipping? Explain Sutherland-Hodgeman polygon clipping.   10

(b) Discuss the advantages of clipping.   4

(c) Explain Cohen Sutherland outcode line clipping algorithm.   6

6. (a) Explain about curve and area clipping.   8

(b) What are called z-buffers?   5

(c) How can you transform a three-dimensional image?   7

7. (a) Discuss about the perspective projection in detail.   10

(b) What do you understand by reflections?   4

(c) How can you animate a two-dimensional picture?   6

8. (a) Write about parallel projection in detail.   6

(b) Explain Warnock's algorithm.   8

(c) Write a note on binary space partition.   6

Group C

9. Answer the following in brief: 2×10

(i) What is display file?

(ii) Give the scaling matrix.

(iii) What is transformation? Write its various types.

(iv) What is flood fill algorithm?

(v) Write different types of parallel projection.

(vi) What is viewing transformation?

(vii) Write the advantages of hidden line removal.

(viii) Name a few animation techniques.

(ix) How do you rotate an object about an arbitrary point.

(x) Compare reflections and viewing projections.

W'11 : 7 FN : CP 424/434 (1459)

COMPUTER GRAPHICS

Time : Three hours

Maximum Marks : 100

Answer FIVE *questions, taking* ANY TWO *from* **Group A,**
ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question (a,b,etc.) should
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented
with neat sketches. Unnecessary long answers may
result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving
proper justification.*

Figures on the right-hand side margin indicate full marks.

Group A

1. (a) Explain *any two* display devices.   8

    (b) Explain halftoning.   4

    (c) Differentiate between random scan and raster scan.   8

2. (a) Draw and explain the block diagram of raster scan
        display system.   8

    (b) Explain Bresenham's line drawing algorithm.   8

    (c) Find the frame buffer size (in bytes) for the system with
        640×480 to store 12 bits per pixel.   4

3. (a) Define geometric transformations.   5

    (b) Differentiate between an area filling and seed fill
        algorithm.   7

AMIE(I) STUDY CIRCLE, SECOND FLOOR, SULTAN TOWER, ROORKEE - 247667 (UTTARAKHAND)   EMAIL: pcourses@hotmail.com   Ph: (01332) 266328   Web: www.amiestudycircle.com

5

(c) Explain DDA algorithm. Also, write the advantages and disadvantages of DDA algorithm.   8

4. (a) What do you know about scaling ? How do you perform scaling a two-dimensional (2D) object and derive the matrix equation ?   8

(b) Can you convert a 2D object into 3D object using transformations ? If possible, derive the matrix for the transformation.   8

(c) Explain filling algorithm.   4

Group B

5. (a) Explain dipping techniques.   6

(b) Describe Cohen-Sutherland algorithm for clipping line under 2D co-ordinate system.   8

(c) Explain reflection in a three-dimensional project.   6

6. (a) Derive the matrix to rotate a three-dimensional object about the principal x and y axes.   8

(b) Derive the transformation matrix for perspective projection.   8

(c) What is windowing transformation ?   4

7. (a) What are the applications of projections ?   4

(b) Write a short note on 'rendering'.   6

(c) Explain hidden line algorithm.   10

8. (a) What is achromatic light ?   4

(b) What are the animation techniques ?   8

(c) Explain about binary space partition.   8

Group C

9. Answer the following in brief : 10×2

(i) What is display file ?

(ii) What is meant by scan buffer ?

(iii) What is transformation ? Mention its types.

(iv) Define antialiasing.

(v) Define viewing transformation.

(vi) Give an example for curve clipping.

(vii) How graphics enhances performance of images visualization and picture quality ?

(viii) What is depth cueing ?

(ix) How projection helps in transformation of 3D objects ?

(x) Explain briefly morphing.

AMIE(I) STUDY CIRCLE, SECOND FLOOR, SULTAN TOWER, ROORKEE - 247667 (UTTARAKHAND)   EMAIL: pcourses@hotmail.com   Ph: (01332) 266328   Web: www.amiestudycircle.com

6

S'12:7FN : CP424/434 (1459)

COMPUTER GRAPHICS

Time : Three hours

Maximum Marks : 100

Answer FIVE *questions, taking* ANY TWO *from* **Group A,** ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

All parts of a question (a, b, etc.) should be answered at one place.

Answer should be brief and to-the-point and be supplemented with neat sketches. Unnecessary long answers may result in loss of marks.

Any missing or wrong data may be assumed suitably giving proper justification.

Figures on the right-hand side margin indicate full marks.

Group A

1. (*a*) Differentiate between the following :   **10**

     (*i*) Painting and drawing

     (*ii*) Raster scan and random scan

     (*iii*) Simulation and animations

     (*iv*) Visualisation and image processing.

    (*b*) Explain the following terms in the context of computer graphics using a suitable diagram and/or mathematical equations or one example :   **10**

     (*i*) Depth Buffer method

     (*ii*) Area sub-division method

     (*iii*) Basic ray tracing algorithm

     (*iv*) Diffuse reflection.

(Turn Over)

AMIE(I) STUDY CIRCLE, SECOND FLOOR, SULTAN TOWER, ROORKEE - 247667 (UTTARAKHAND)   EMAIL: pcourses@hotmail.com   Ph: (01332) 266328   Web: www.amiestudycircle.com

7

2. (*a*) P is a line passing through A $(1, 0, -3)$ and B $(2, -4, -2)$, Q is another line passing through C $(2, -4, -1)$ and D $(6, -8, -3)$. Find, in degree, the acute angle between P and Q. 6

(*b*) Find the intersection point of the lines : 8

$$\frac{x-2}{1} = \frac{y-3}{2} = \frac{z-6}{3} \text{ and } \frac{x-4}{2} = \frac{y-6}{3} = \frac{z-11}{5}$$

(*c*) Find the locus of a point P which moves so that its distance from the line $x = 0$ is twice its distance from the line $y = 1$. 6

3. (*a*) A polygon has four vertices located at A(0, 0), B(3, 0), C(3, 3), D(0, 3). Apply transformations on the polygon :

(*i*) Translate two units along *x*-axis ; and

(*ii*) Xy shear along the origin.

You must make and state suitable assumptions. 5

(*b*) Explain the oblique projection. Obtain the isometric view of a cuboid of size 8 × 6 × 4. 5

(*c*) Obtain perspective transformation on to $z = 2$ plane, where centre of projection is at (0, 0, 10). Also, define the term 'vanishing point'. 4

(*d*) What are the uses of Bezier curves in computer graphics ? Draw a Bezier curve having the control points P1(0,0), P2 (2, 5), P3(5, 9), P4(10, 20). Calculate the co-ordinates of the points on the curve corresponding to parameter $u = 0.2, 0.4, 0.6$. Draw a rough sketch of the curve and show co-ordinates of various points on it. 6

4. (*a*) Write the differences between Raster scan display and vector scan display. 4

(*b*) Describe the mid-point circle drawing algorithm with a suitable example. 6

(*c*) Comment on aliasing and anti-aliasing with an example. 4

(*d*) (*i*) What are the advantages of rendering by patch splitting ? 2

(*ii*) Define B-spline curve. 2

(*iii*) What is spline ? 2

Group B

5. (*a*) What do you mean by line clipping and polygon clipping ? 4

(*b*) Compare and contrast different line clipping algorithms in terms of fewer comparison and division operations to clip a line. 5

(*c*) Write the steps of Sutherland-Hodgman's polygon-clipping algorithm. Explain with a suitable example. 8

(*d*) Write four cases of polygon clipping against one edge. 3

6. (*a*) Write the properties of Bezier curve giving their usefulness. 5

(*b*) When a three-dimensional object is to be rotated about any axis, that is parallel to *x*-axis, one needs to perform some additional transformation. Derive the three-dimensional rotation transformation matrix for rotation of an object about *x*-axis. 10

AMIE(I) STUDY CIRCLE, SECOND FLOOR, SULTAN TOWER, ROORKEE - 247667 (UTTARAKHAND)   EMAIL: pcourses@hotmail.com   Ph: (01332) 266328   Web: www.amiestudycircle.com

8

(c) What is an Open GL ? What are the features of graphics library ?   5

7. (a) Perform a 45° rotation of triangle A (0, 0), B(1, 1), C(5, 2) (i) about the origin, and (ii) about point P(−1, −1).   4 + 4

(b) A general purpose language is often used to program the animation functions, but several specialized animation languages have been developed. Give the names of these languages and explain in brief.   4

(c) Name the available method for inside-outside test of point for polygon. Critically comment on those methods.   4

(d) What are the differences between bitmap and pixelmap ?   4

8. (a) Explain reflection and shear.   4

(b) Critically comment on hidden line removal techniques.   4

(c) What do you mean by animation ? What are different kinds of animation techniques used in graphics system ?   2 + 6

(d) Define parallel projection, perspective projection, projection reference point, orthographic parallel projection.   4

Group C

9. Answer the following in brief :   10 × 2

(i) What is shadow mask ?

(ii) What is frame buffer ?

(iii) Define morphing.

(iv) What is interlacing ?

(v) What do you mean by aliasing problem in line drawing algorithm ?

(vi) What do you mean by MIDI file format ?

(vii) What do you mean by graphic operators ?

(viii) What are the conditions for point clipping ?

(ix) What is flood-filling ?

(x) What is vector graphics ?

AMIE(I) STUDY CIRCLE, SECOND FLOOR, SULTAN TOWER, ROORKEE - 247667 (UTTARAKHAND)   EMAIL: pcourses@hotmail.com   Ph: (01332) 266328   Web: www.amiestudycircle.com

9

W'12 : 7FN : CP 424/434 (1459)

COMPUTER GRAPHICS

Time : Three hours

Maximum Marks : 100

Answer FIVE *questions, taking* ANY TWO *from* **Group A,**
ANY TWO *from* **Group B** *and* ALL *from* **Group C.**

*All parts of a question (a,b,etc.) should
be answered at one place.*

*Answer should be brief and to-the-point and be supplemented
with neat sketches. Unnecessary long answers may
result in loss of marks.*

*Any missing or wrong data may be assumed suitably giving
proper justification.*

Figures on the right-hand side margin indicate full marks.

Group A

1. (a) Explain *any three* uses of computer graphics.   6

    (b) Compare between line printer and dot matrix printer.
         List the advantages of laser printer.   7

    (c) Mention two software standards and explain them in
         short.   7

2. (a) Explain, with a neat diagram, how video display works. 10

    (b) Discuss about different input modes used in interac-
         tive computer graphics.   10

3. (a) Explain the steps of Bresenham's line drawing
         algorithm. Using this algorithm, draw a line with the
         end points : (10, 10) and (60, 40).   10

(b) Explain the steps of mid-point circle drawing algorithm. Applying the algorithm, draw a circle with radius 20 and centre is at (0, 5). 　10

4. (a) Explain the utility of matrix representation for transformation of object. Describe the matrix formulation of two-dimensional transformation : translation, rotation and scaling. 　12

(b) What is composite transformation ? Explain with an ·example. 　8

Group B

5. (a) Give Cohen-Sutherland algorithm for clipping line in 2 D co-ordinate system. Extend your idea for the same under 3-D co-ordinate system. 　12

(b) Given a clipping window : $P(0, 0)$, $Q(340, 0)$, $R(340, 340)$ and $S(0, 340)$. Find the line AB : [(−170, 595), (170, 255)], against the given window, using Cohen-Sutherland algorithm. 　8

6. (a) Explain the idea behind 3-D rotation. 　8

(b) In a 3-D system, a point is rotated by an angle θ about the origin in $x - y$ plane. Then the point is rotated by an angle β about the origin in $y - z$ plane. Derive the transformation matrix for this two-step process. 　12

7. (a) Explain different 3-D viewing devices. Write the steps for 3-D viewing process. 　8

(b) What is projection ? Does projection preserve straight line ? 　5

(c) Explain isometric projection for a cube. Compare parallel and perspective projections. 　7

8. (a) What are the necessary components for animation ? Give some applications of animation. 　6

(b) Give the idea to roll a wheel on a 2-D surface plane. 　8

(c) What are visible surface detection algorithms ? 　6

Group C

9. Answer the following in the brief : 　10 × 2

(i) Digitizer

(ii) Video adapter

(iii) Compute the height of the resized image 1024 × 768 to one that is 640 pixels with the same aspect ratio.

(iv) Bitmap

(v) Raster scan

(vi) Clipping

(vii) Vanishing point

(viii) Aliasing

(ix) Uniform scaling

(x) Reflection.